



Novel nanoparticle technology for the identification of novel cancer markers

Our team has developed a novel nanoparticle technology which is being applied to samples such as human plasma, urine and cell extracts to capture and comparatively analyse small proteins as potential cancer markers.

Small and low abundance peptides and proteins, which may represent metabolic breakdown products or be released from diseased tissue, are difficult to detect and identify in complex biological fluids such as plasma due to the presence of very high abundance serum proteins. The concentration of different proteins in human plasma spans at least 10^{12} orders of magnitude, making fractionation and concentration the key to identifying and analysing such protein groups.

Our group has developed a novel nanoparticle-based technology, capable of capturing small proteins directly from biological samples. These nanoparticles are synthesized in our laboratory, and are able to specifically harvest and concentrate small proteins efficiently and rapidly from biological samples. By applying simultaneous affinity capture with size exclusion, abundant serum proteins that would otherwise interfere with the analysis and identification of these small proteins are specifically removed from the sample. This approach confers a significant advantage over other methods for the analysis of differentially expressed peptides and proteins in circulation.

We are currently using these nanoparticles to capture cancer-specific proteins from clinical samples, for comparative analysis and identification of cancer-specific changes in plasma. Ongoing work includes the analysis of captured proteins using multiplexed, isobaric protein labelling technologies combined with several types of mass spectrometry, as well as subsequent validation studies using multiplexed ELISA assays, western blotting and multiple reaction monitoring.

Team - Nanoparticles

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